BRANCHED PARAPHYSES OF BRYUM ROSEUM.

By E. J. Hill.

In the early part of November, 1902, specimens of *Bryum roseum* Schreb. were collected. They grew in a clay loam soil on the bank of a creek at Elmhurst, Ill , their most common associates being *Atrichum angustatum* and *Porella platyphylla*. Being without fruit they were placed in a packet and laid aside for future study. since their appearance suggested that they might be male plants. The packet kept in the warm air of a room soon became dry and was not opened until the end of January of this year. Nearly all the plants examined bore abundant archegonia and in most of them the paraphyses were prevailingly branched, the cells well filled with chlorophyl and had the form of protonema. Schimper calls attention to this chlorophyllose feature. remarking in his synopsis (Synopsis Musc. Eur., Introductio, p. xv.): "If we consider color, the paraphyses of *B. roseum* are seen to be green and filled with grains of chlorophyl." Limpricht (Die Laubmoose, **2**:445, 1895,) repeats the statement when mentioning the male flowers: "Antheridia very numerous, mixed with filiform chlorophyllose, paraphyses and little leaflets."

This property of chlorophyl-bearing is a common occurrence in mosses with clavate paraphyses, as those of *Funaria*, *Aphanoregma*, and the *Physcomitraceae* in general, but in my experience is infrequent in those with filiform paraphyses.

I do not quite understand the statement of Ruhland (Die Natürlichen Pflanzenfamilien, **1**:3, p. 217) that paraphyses "always contain chlorophyl," since from the context he does not seem to limit the property to any form of them, but is concerned rather with their number. They generally appear hyaline or of some other color than green, as yellow, red or purple. It is possible that under chlorophyl are included the various pigments into which it may be transformed or broken up, such as xanthophyl, erythrophyl, etc., but the statement is a very broad one at best.

There is a strong probability that these branched paraphyses are protonemic in character and function. though no buds were found or developed on them. Some were kept moist under a bell-glass for several weeks but left attached to the plants. It resulted chiefly in increasing their length and probably the number of branched forms, as in such cases those without a branch were greatly in the minority. Detached examples placed under other conditions of growth finally shriveled; but this was doubtless due to imperfect facilities for cultivation. Such paraphyses cannot be distinguished from the ordinary protonemata of mosses before the appearance of buds. The cylindrical cells are plump and devoid of the shrunken look common to most filiform paraphyses. Buds do not necessarily appear on protonema. Goebel, (Organography of Plants, **1**: 239, 1900,) treating of the influence of external stimuli, makes the statement: "Moss-buds appear upon the protonema only when the intensity of light is higher than that which is required for the normal growth of protonema. If the formation of buds does not take place, the protonema may theoretically continue its growth to an unlimited extent."

The derivations of brood-bodies from paraphyses is mentioned by Correns (Vermehrung der Laubmoose, p. 419, 1890,) who succeeded in obtaining protonema from isolated paraphyses of male flowers of Funaria: "As is known, these are club shaped and end in a large globose cell rich in chlorophyl. This is frequently divided longtitudinally or transversely. I expected to obtain protonema directly from these cells but was disappointed; it always sprang from cells lower down." His conclusion is (l. c., p. 360): "I believe that the derivation of brood-bodies from paraphyses is correct if they have in general up to the present time been traced to organs occurring in the male flowers."

These protonema-like paraphyses point to another means by which *Bryum roseum* may perhaps be propagated. It has a ready mode of multiplying by its abundant stolons and is also proliferous (Synop. Musc. Frond. 1: 247, 1849,) "Planta e perigonio saepe prolifera." (Dixon and Jameson, Handbook Brit. Mosses, p. 341): "The stems are frequently continued beyond one rosette, subsequently forming another and innovations are produced below the flowers." The statement is often made by authors that it rarely fruits, probably more rarely in Europe than in America. This is so much the case in Great Britain that Dixon and Jameson call special attention to it (l. c,, p. 341): "The fruit is exceedingly rare and has only been found in three or four British localities." With an experience of more than thirty years, during which the moss has frequently been observed or collected, I have found it fruiting but twice, at Miller, Indiana, 1878, and the same year at Boyne Falls, Michigan.

These branched paraphyses are from 1–2 mm. long (mostly 1.4-1.7 mm.) and are generelly provided with a single branch, sometimes two. As shown in the illustration, Fig. 1, the branches originate from the end of a cell as one frequently sees in fresh-water Algæ, but are so oriented that it is hard to tell whether from one above or below, being contiguous to both at the junction. I saw no exception to this.

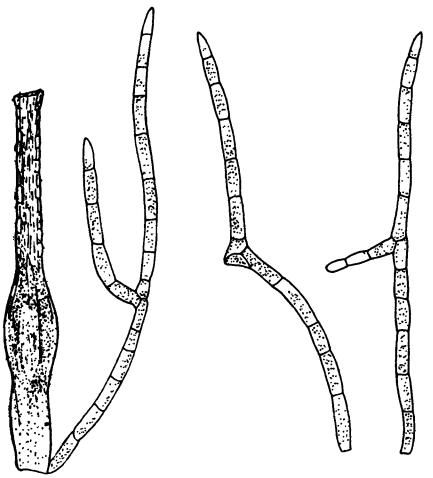

Fig. 1. *Bryum roseum.*
Archegonia, 1 mm. × 50 diam.
Paraphyses, 1–2 mm. × 50 diam.

After the drawing was made one was noted with three branches. The first was nearly basal and consisted of four cells; the second started two cells above this and had two cells; the third, three cells above the second and was a single cell. The paraphysis continued ten cells above the last.

I am indebted to Mrs, Agnes Chase for the accurate drawing of the paraphyses and archegonium. Chicago, Ill., June, 1903.

Plate X. Leaves × 40 Cells cross-section of stem × 280.

Fig. 1. *Stereodon plicatulus* Lindb., Yukon. Lake Lindeman. R. S. Williams. May 30,1898
Fig. 2 *S. plcatulus,* Lindd., Silberia, Arnell, Sept 18, 1876.
Fig. 3. *S.revolutus* Mitt., Kongsvold, Dovre, Norway, S. O. lindberg,. July 8, 1882.
Fig. 4. *S. plicatulus,* Lindb., Jenisei, Siberia. Arnell Sept. 13 1870.
Fig. 5. *S. callichroum* Brid , Naes Norway. C. Rosenberg, Aug. 6, 1854.

STEREODON PLICATULUS LINDB.

By Harald Lindberg.

In the last number of The Bryologist (May, 1903). p. 42-43 is to be found an article " Notes on Nomeclature, II.," by Elizabeth G. Britton, in which Mrs. Britton writes that I recently have examined specimens of *Stereodon plicatulus* Lindb, collected byb Arnell in siberia, and pronounced this species to be the same as *Stereodon revolutus* Mitt. In Novenber, 1900, I receved from Mr. R. S. Williams a specimen collected by him(May 30, I898) at Lake Lindeman in the tukon Region, Fig I, ang sent with the following inscription: "*Hypnum subplicatile* (lindb.) Limpr.?" this moss I examined and found it identical with specimens of *Stredon plicatulus* lindb. (*Hypnum sublicatile* (Lindb.) Limpr.) collected by Arnell at Jenisei in Siberia, Fig. 2. I have never said that *Stereodon plicatulus*